USACHPPM

# U.S. Army Center for Health Promotion and Preventive Medicine




**TOXICOLOGICAL STUDY NO. 73-87-5F7-96, ECOLOGICAL STUDY OF WHITE FOOTED MICE, ABERDEEN PROVING GROUND, MARYLAND, EDGEWOOD AREA (J-FIELD), February 1996**



*Readiness Thru Health*

# U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE

The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) lineage can be traced back over a half century to the Army Industrial Hygiene Laboratory which was established at the beginning of World War II under the direct jurisdiction of The Army Surgeon General. It was originally located at the Johns Hopkins School of Hygiene and Public Health with a staff of three and an annual budget not to exceed three thousand dollars. Its mission was to conduct occupational health surveys of Army-operated industrial plants, arsenals, and depots. These surveys were aimed at identifying and eliminating occupational health hazards within the Department of Defense's (DOD) industrial production base and proved to be extremely beneficial to the Nation's war effort.

Most recently, the organization has been nationally and internationally known as the U.S. Army Environmental Hygiene Agency (AEHA) and is located on the Edgewood area of Aberdeen Proving Ground, Maryland. Its mission had been expanded to support the worldwide preventive medicine programs of the Army, DOD and other Federal agencies through consultations, supportive services, investigations and training.

On 1 August 1994, the organization was officially redesignated the U.S. Army Center for Health Promotion and Preventive Medicine and is affectionately referred to as the CHPPM. As always, our mission focus is centered upon the Army Imperatives to that we are optimizing soldier effectiveness by minimizing health risk. The CHPPM's mission is to provide worldwide scientific expertise and services in the areas of:

- Clinical and field preventive medicine
- Environmental and occupational health
- Health promotion and wellness
- Epidemiology and disease surveillance
- Related laboratory services

The Center's quest has always been one of customer satisfaction, technical excellence and continuous quality improvement. Our vision is to be a world-class center of excellence for enhancing military readiness by integrating health promotion and preventive medicine into America's Army. To achieve that end, CHPPM holds everfast to its core values which are steeped in our rich heritage:

- Integrity is our foundation
- Excellence is our standard
- Customer satisfaction is our focus
- Our people are our most valuable resource
- Continuous quality improvement is our pathway

Once again, the organization stands on the threshold of even greater challenges and responsibilities. The CHPPM structure has been reengineered to include General Officer leadership in order to support the Army of the future. The professional disciplines represented at the Center have been expanded to include a wide array of medical, scientific, engineering, and administrative support personnel.

As the CHPPM moves into the next century, we are an organization fiercely proud of our history, yet equally excited about the future. The Center is destined to continue its development as a world-class organization with expanded preventive health care services provided to the Army, DOD, other Federal agencies, the Nation, and the world community.

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1. PURPOSE.

a. The objective of this study were two fold: 1) to assess the level of contaminants in the resident white footed mouse population and 2) to determine any resultant physiological effect. The contaminant evaluation included whole body analysis for organochlorine pesticides, polychlorinated biphenyls (PCBs), and metals (arsenic, cadmium, chromium, lead, mercury, and barium). The biological evaluation included gross physical exam and selective histopathology.

b. This information will be used by Argonne National Laboratory (ANL) as a portion of their ecological risk assessment of J-Field. The ecological risk assessment will address whether the contamination on J-Field is posing a health risk to the white footed mouse population and to higher organisms in the food chain.

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19. **ABSTRACT**

2. CONCLUSIONS.

a. The levels of pesticides and PCBs in mice from J-Field were minimal. Pesticide levels in three mice and PCB levels in two mice were slightly above the method detection limits. Most of the reported levels of metals in mice from J-Field were below the method detection limits. However, these method detection limits were higher than expected so that the assessment for metals is limited.

b. The health of the resident white footed mouse population at J-Field based on gross and selected histology appeared to be normal. Pathological findings in the liver, intestine, and skin from several mice were associated with parasitic infestation, a natural consequence of field life. The reproductive organs harvested from several female mice were normal and active.

3. RECOMMENDATIONS. To determine the health risk to terrestrial predators, the maximum concentrations or half of the method detection limits for "nondetected" metals should be used in the terrestrial bioassessment model developed by ANL. The limitations associated with the metals analysis and the histopathology evaluation should be noted in the risk assessment.

DEPARTMENT OF THE ARMY
U.S. ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
ABERDEEN PROVING GROUND, MARYLAND 21010-5422

REPLY TO
ATTENTION OF

# EXECUTIVE SUMMARY
# FINAL REPORT
# TOXICOLOGICAL STUDY NO. 73-87-5F7-96
# ECOLOGICAL STUDY OF WHITE FOOTED MICE
# ABERDEEN PROVING GROUND, MARYLAND
# EDGEWOOD AREA (J-FIELD)
# FEBRUARY 1996

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DEPARTMENT OF THE ARMY
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# ECOLOGICAL STUDY OF WHITE FOOTED MICE
# ABERDEEN PROVING GROUND, MARYLAND
# EDGEWOOD AREA (J-FIELD)
# FEBRUARY 1996

1. REFERENCES. See Section 10 for a listing of references.

2. AUTHORITY. Phone Conversations: 1 September 1994 between this Center (Dr. Janet Whaley) and Argonne National Laboratory (Dr. Ihor Hlohowskyj); 20 September 1994 between this Center (Dr. Janet Whaley) and Aberdeen Proving Ground Support Activity (Mr. John Paul).

3. PURPOSE.

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b. This information will be used by Argonne National Laboratory (ANL) as a portion of their ecological risk assessment of J-Field. The ecological risk assessment will address if the contamination on J-Field is posing a health risk to the white footed mouse population. If the health risk to these animals is great, the relative risk to higher organisms may also be increased.

4. BACKGROUND.

a. Aberdeen Proving Ground (APG), Maryland is on the National Priorities List. As part of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) process, a portion of APG, J-Field, is being studied to characterize the contamination and to determine the potential risk to the ecosystem. The ANL has been designated the lead for the

ecological risk assessment at J-Field. Because of its expertise, this Center was requested by the APG Directorate of Health, Safety, and the Environment to assist ANL with the terrestrial ecological risk assessment.

b. The J-Field is a peninsula on the southern-most extension of APG, Maryland, Edgewood Area (see Figure 1.1). Its access is restricted. It is currently used for detonation of unexploded ordnance. Areas of assessment at J-Field include: Toxic Burn Pits (where toxic waste was once burned and/or destroyed); Riot Control Pits (for the destruction of riot control agents); and the Detonation/Demolition Ground (an area still used; for a more detailed explanation see Nemeth, 1989). Based on preliminary soil, sediment, and surface water results (Nemeth, 1989), the list of potential contaminants is as follows: organochlorine pesticides, PCBs, barium, lead, cadmium, mercury, chromium, and arsenic.

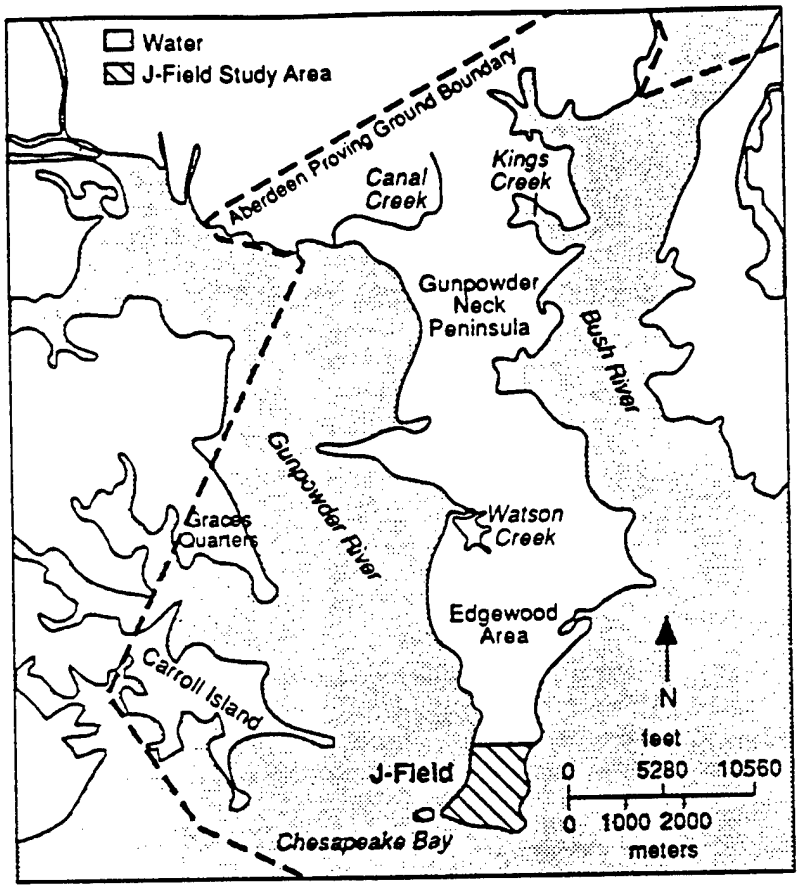
c. The reference site is a 2.712 acre privately owned woodlot located in Harford County Maryland. This site is approximately ten miles from J-Field and separated from APG by two major highways (I-95 and Route 40), see Figure 1.2. County records and aerial photographs indicate that there have been no commercial, agricultural or residential activities on this site during the past 40 years. The property is currently surrounded by either agricultural or low density residential pursuits. No commercial activities are located within a half mile radius of the site.

d. The white footed mouse (*Peromyscus leucopus)* represents a population of mammals that are intimately associated with soil during their daily lives. Soil exposure may occur during burrowing practices, preening behavior, and inadvertent exposure during feeding. Another route of exposure, and possibly the most important, is through the food chain. Much of the diet of white footed mice is comprised of plants, invertebrates, and insects. The habitat on J-Field is conducive for such exposure and several of the contaminants in soil at J-Field have the potential of bioaccumulating in the various dietary sources (Nemeth 1989).

e. To assess the potential body burden and resultant adverse physiological responses from contaminant exposure at J-Field, two types of bioassessments were measured: (1) body burden and (2) histopathology. The data generated from these assessments were compared with similar data from the reference site, a presumably uncontaminated site offpost.

f. The chemicals of potential concern were selected based on their presence on site and bioaccumulation potential. Chemical uptake involves the process of bioconcentration/ bioaccumulation which is defined as the extent of chemical partitioning at equilibrium between a biological medium such as fish tissue or plant tissue and an external medium such as water (EPA, 1989). The potential for a chemical to bioconcentrate (chemical taken up from water) or bioaccumulate (chemical taken up from food, sediment, or water) is dependent on its

**Figure 1.1 Relative Location of J-Field to Aberdeen Proving Ground, Maryland** (from Work Plan for Conducting an Ecological Risk Assessment at J-Field, Aberdeen Proving Ground, Maryland, ANL., March 1993).



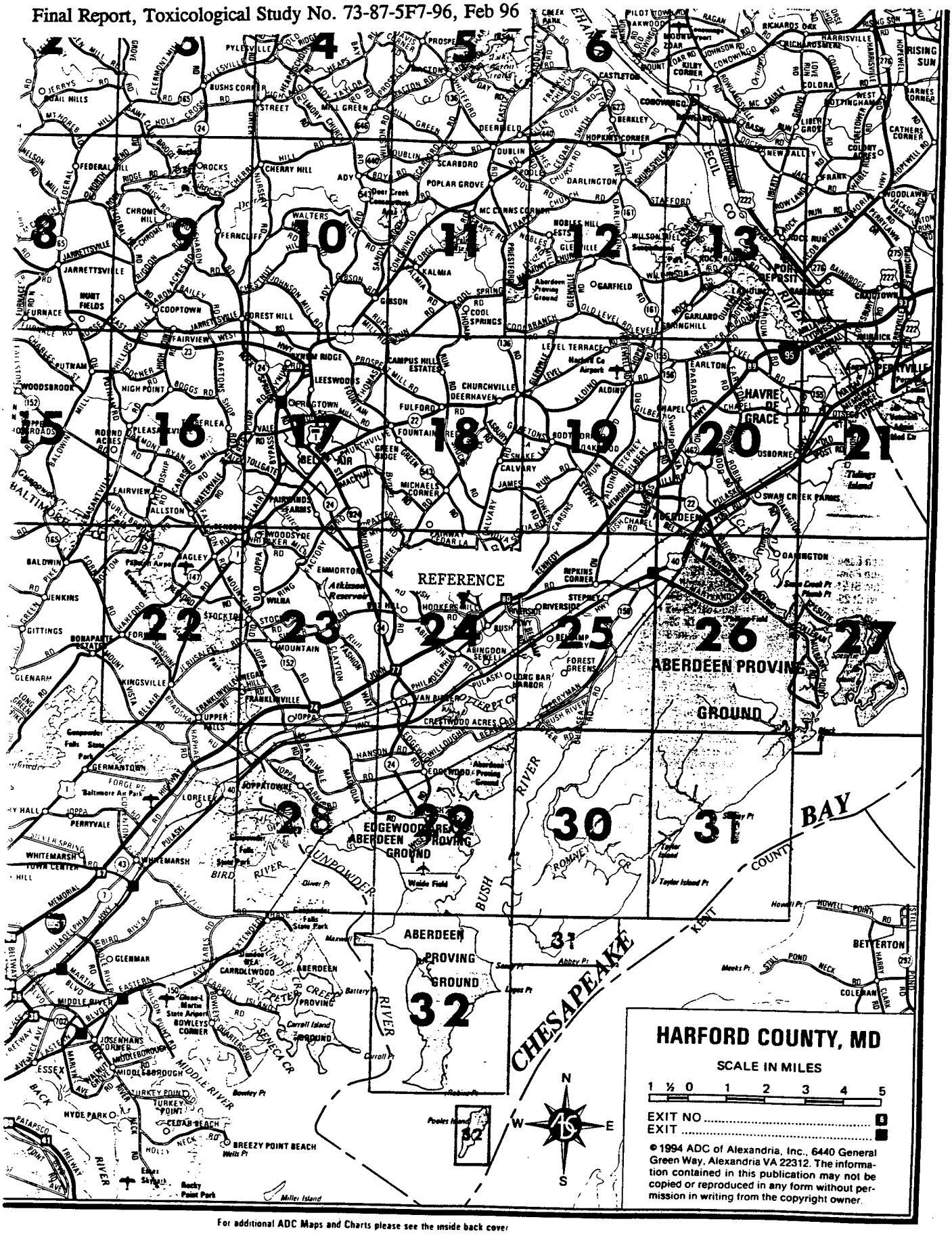



Figure 1.2 Relative Location of the Reference Site to Aberdeen Proving Ground

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octanol-water partitioning coefficient or Kow (Amdur, et al., 1991). The higher the Kow, the more likely the chemical will bioaccumulate. Age, sex, and season can all play an important role in the bioaccumulation of contaminants as well.

g. All animals underwent a gross necropsy. Grossly abnormal tissues were sampled for histopathology examination. Pathology can be an indicator of effects from environmental exposure to a chemical or mixtures of contaminants. It can provide evidence of exposure to chemicals that do not bioaccumulate. Furthermore, pathology can integrate the toxicological and pharmacokinetic interactions resulting from exposure to complex mixtures of contaminants and present a biologically relevant measure of toxicant action at target tissues and the cumulative adverse effect of the exposure (Sandhu, et al., 1990).

## 5. MATERIALS AND METHODS.

a. Trapping. White footed mice (*Peromyscus leucopus*) were collected from three study sites on J-Field (toxic burn pits, riot control agent pits, and demolition grounds) and from a referencel site offpost, see Figure 1.3. Trapping occurred over a 2-week period during mid July 1995. Sherman live traps were used, baited with a mixture of rolled oats and peanut butter, set at dusk, and collected during early morning. All animal processing was done in a temporary laboratory located near J-Field. Special handling of the specimens was enforced to include full-face respirators, gloves and tyvex suits to prevent exposure to potential zoonotic diseases (e.g., hantavirus).

b. Necropsy. The collected mice were euthanized with $CO_2$, weighed, measured, aged (based on weight and pelage) and sexed. Tissues for histopathology and residue analysis were collected at necropsy. Gross pathological findings were noted by the prosector and the histopathology interpretation was done by a veterinary pathologist, U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM). The carcasses were skinned, placed in 6 oz. glass jars (teflon coated lids), and frozen at -33 °C until the time of chemical analysis.

c. Chemical Analysis. Whole body burden concentrations were determined by the USACHPPM, Directorate of Laboratory Sciences (DLS). All samples were submitted to the analytical labs in accordance with the DLS standard operating procedure (SOP) No. 5, DLS Chain of Custody. Samples for metal analysis were prepared by the Method Development and Analytical Sciences Program (MDASP) in accordance with MDASP 23.1. Metal determination was done by the Analytical Chemistry Program is accordance with MDP 22 (cold vapor atomic absorption) for mercury, Instrument Operating Procedure (IOP) 17 (inductively coupled plasma mass spectrometry) for arsenic and barium, IOP 22.1 (inductively coupled plasma atomic emission spectroscopy) for chromium, and IOP 8.2 (graphite furnace

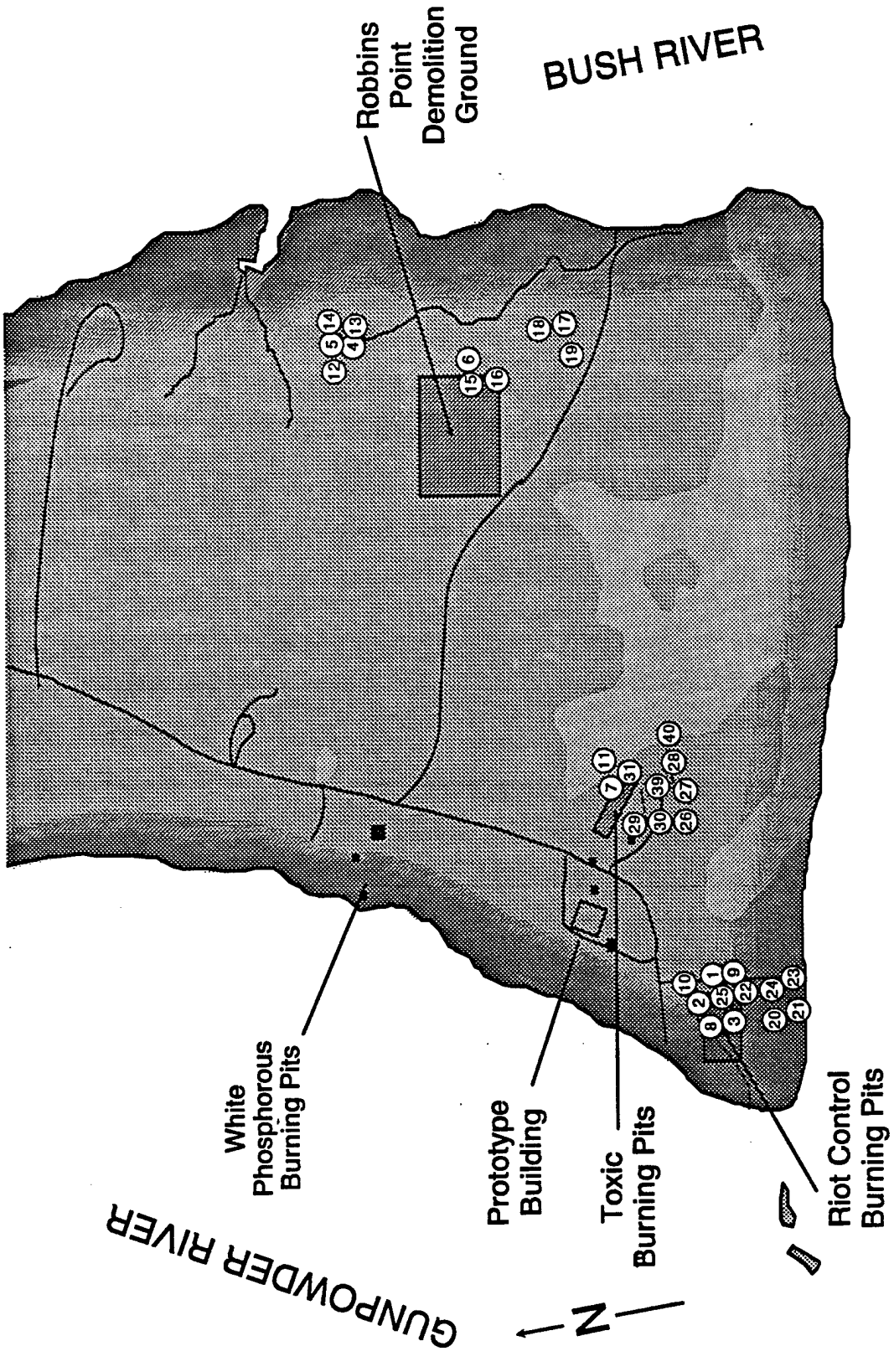


Figure 1.3 Trap Locations at J-Field

atomic absorption spectroscopy) for cadmium and lead. Organochlorine pesticide and PCB determination was made by the Pesticides and Organics Chemistry Program (POCP) in accordance with POCP 160.1 (electron-capture gas chromatography). See Appendix B for the SOPs and Method Detection Limits.

6. RESULTS.

a. Trapping. Between 6 and 27 July 1995, 46 mice were caught and processed. The number of males caught was 28 (27 adults and 1 juvenile) and females was 18 (16 adults and 2 juveniles). See Appendix A for the necropsy notes which include the following information: animal number, trap site, date of collection trap number, gender, approximate age, body weight, total body length, tail length, tissues harvested for histopathology, and specific comments.

b. Necropsy/Pathology. A complete necropsy was performed on all 46 mice (see Table 1). Gross lesions noted by the principal investigator (i.e., liver, intestine, and skin) from four mice (two from J-Field and two from the reference site) were submitted for histopathology. The abnormal histological findings were associated with parasitic infestation. Reproductive tracts (uterus and ovaries) from nine female mice (four from J-Field and five from the reference site) were also sampled to assess the reproductive status. All of the reproductive tracts were normal and active. One female from the toxic burn pits was pregnant with four fetuses. See Appendix A for the pathology report.

c. Chemical Analysis.

(1) Metals (see Tables 2-5). Metal levels in most of the mice were below the method detection limits. However, lead in specimen #16 (demolition ground), chromium in specimen #36 (control), and barium in specimen #43 (control) exceeded the method detection limits. See Appendix B for chemical data.

(2) Pesticides (see Tables 2-5). Pesticide levels in most of the mice were below the method detection limits. However, DDE, p,p' in specimens #3 (riot control pits), #5, #16 (demolition grounds), and #41 (control) slightly exceeded the method detection limits. See Appendix B for chemical data.

(3) PCBs (see Tables 2-5). The PCB levels in most of the mice were below the method detection limits. However, Aroclor® 1260 in specimens #1 and #22 (riot control pits) slightly exceeded the method detection limits. See Appendix B for chemical data.

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® Aroclor is a registered trademark of Monsanto Co., St. Louis, Missouri. Use of company names does not imply endorsement by the U.S. Army but is intended only to assist in identification of a specific product.

**Table 1. Necropsy Data Sheet of Peromyscus leucopus Caught from J-Field, APG, MD.**

| RIOT CONTROL PITS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ID# | DATE | TRP# | SEX | AGE | BODY WT (g) | BODY LGTH (mm) | TAIL LGTH (mm) | TISSUES | COMMENTS |
| 1 | 6-Jul | RCP 20 | M | A | 25.9 | 100 | 75 | | Distinct bicolor coat |
| 2 | 6-Jul | RCP 14 | F | YA | 20 | 95 | 70 | | Two corpus luteum on left ovary |
| 3 | 6-Jul | RCP 23 | M | YA | 19.4 | 99 | 79 | | Nothing significant |
| 8 | 7-Jul | RCP 9 | M | A | 24.8 | 91 | 70 | | Small red-ring lesion inside left ear at base |
| 9 | 7-Jul | RCP 20 | M | A | 21.2 | 90 | 70 | | Nothing significant |
| 10 | 7-Jul | RCP 23 | F | A | 26.3 | 93 | 76 | Liver | Three corpus hemorrhagica, one corpus luteum on left ovary, central lobular congestion in liver |
| 20 | 11-Jul | RCP 3 | F | Y | 14.8 | 80 | 62 | | Uterus immature, not large |
| 21 | 11-Jul | RCP 4 | F | A | 19.1 | 89 | 71 | Liver, Uterus | Liver-worm-like objects in 2 lobes (cranial lobes): Uterus-round nodule on outer surface of uterus |
| 22 | 11-Jul | RCP 30 | M | A | 21.9 | 87 | 71 | | |
| 23 | 11-Jul | RCP 5 | M | A | 24.2 | 92 | 80 | | Both ears chewed at tips |
| 24 | 11-Jul | RCP 7 | M | Y | 17.8 | 87 | 72 | | Both ears chewed at tips, small testicles not descended |
| 25 | 11-Jul | RCP 22 | F | A | 21.2 | 94 | 73 | Uterus | Slightly swollen, used for comparison |
| **DEMOLITION GROUNDS** | | | | | | | | | |
| ID# | DATE | TRP# | SEX | AGE | BODY WT (g) | BODY LGTH (mm) | TAIL LGTH (mm) | TISSUES | COMMENTS |
| 4 | 6-Jul | DG 13 | M | A | 20.7 | 105 | 75 | | Left ear notched |
| 5 | 6-Jul | DG 14 | F | A | 15.3 | 90 | 75 | | Left ear notched, Uterus slightly swollen, Bottom lip - round dark lesion |
| 6 | 6-Jul | DG 30 | M | A | 20.5 | 100 | 75 | | Left ear notched, Right ear-small round hole |
| 12 | 8-Jul | DG 8 | M | A | 23.6 | 95 | 73 | | Nothing significant |
| 13 | 11-Jul | DG 13 | M | A | 24.8 | 93 | 80 | | |
| 14 | 11-Jul | DG 14 | M | A | 20.9 | 82 | 72 | | |
| 15 | 11-Jul | DG 17 | F | A | 18.1 | 83 | 70 | | Swollen uterus |
| 16 | 11-Jul | DG 19 | M | A | 23.6 | 90 | 70 | | |
| 17 | 11-Jul | DG 25 | F | A | 16.4 | 85 | 66 | | Swollen uterus |
| 18 | 11-Jul | DG 24 | M | A | 26.1 | 95 | 80 | | |
| 19 | 11-Jul | DG 27 | M | A | 23.4 | 92 | 72 | | |

F = Female Y = Young
M = Male A = Adult

**Table 1. Necropsy Data Sheet of Peromyscus leucopus Caught from J-Field, APG, MD.**

| TOXIC BURN PITS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ID# | DATE | TRP# | SEX | AGE | BODY WT (g) | BODY LGTH (mm) | TAIL LGTH (mm) | TISSUES | COMMENTS |
| 7 | 6-Jul | TBP 4 | F | A | 14.3 | 90 | 75 | | Several corpus luteum on both ovaries, ticks-nymphs-both ears |
| 11 | 8-Jul | TBP 4 | F | YA | 14 | 81 | 57 | | No corpus luteum on ovaries |
| 26 | 11-Jul | TBP 24 | M | A | 24.9 | 96 | 76 | | Tips of both ears chewed |
| 27 | 11-Jul | TBP 25 | F | Y | 15 | 83 | 70 | | Small uterus |
| 28 | 11-Jul | TBP 29 | M | A | 21.6 | 91 | 73 | | |
| 29 | 12-Jul | TBP 1 | M | A | 21.7 | 95 | 79 | | Left ear notched |
| 30 | 12-Jul | TBP 8 | F | A | 21.8 | 95 | 69 | Uterus | Used for comparison |
| 31 | 25-Jul | TBP 4 | M | A | 21.8 | 95 | 83 | | |
| 39 | 27-Jul | TBP 3 | F | A | 17.4 | 90 | 70 | Uterus w/ fetuses | Pregnant-4 fetuses |
| 40 | 27-Jul | TBP 20 | M | A | 21.2 | 95 | 70 | | |
| **REFERENCE** | | | | | | | | | |
| ID# | DATE | TRP# | SEX | AGE | BODY WT (g) | BODY LGTH (mm) | TAIL LGTH (mm) | TISSUES | COMMENTS |
| 32 | 25-Jul | C 8 | F | A | 20 | 92 | 74 | Uterus, Groin, Intestine | Parasite in groin area, Lump on outside of intestine-Pyer's patches |
| 33 | 25-Jul | C 9 | M | A | 25.5 | 101 | 75 | | |
| 34 | 25-Jul | C 22 | F | A | 15.3 | 88 | 77 | Uterus | |
| 35 | 25-Jul | C 21 | M | A | 17.5 | 91 | 80 | | |
| 36 | 26-Jul | C 7 | M | A | 23 | 95 | 80 | | |
| 37 | 26-Jul | C 5 | F | A | 23.6 | 95 | 80 | Uterus, small intestine | Mammaries prominent-no lactation, Bumps on intestinal surface-Pyer's patches |
| 38 | 26-Jul | C 9 | M | YA | 20.2 | 87 | 68 | | |
| 41 | 27-Jul | C 40 | M | A | 20.2 | 95 | 68 | | |
| 42 | 27-Jul | C 2 | F | A | 16.5 | 87 | 68 | Uterus, ovaries | Both appear normal |
| 43 | 27-Jul | C 37 | F | A | 18.6 | 100 | 79 | Uterus, ovaries | Both appear normal |
| 44 | 27-Jul | C 36 | M | A | 18.7 | 94 | 71 | | |
| 45 | 27-Jul | C 35 | M | A | 20.5 | 95 | 53 | | |
| 46 | 27-Jul | C 19 | M | A | 23.2 | 99 | 75 | | |

F = Female Y = Young
M = Male A = Adult

**Table 2.** Chemical Residue Data of Peromyscus leucopus from J-Field, APG, MD.

## RIOT CONTROL PITS

| | | | Metals (mg/kg) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| ID # | Sex | Age | As | Ba | Cd | Cr | Hg | Pb | Pesticides (mg/kg) | PCBs (mg/kg) |
| 1 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | 0.13 (aroclor 1260) |
| 2 | F | YA | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 3 | M | YA | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | 0.006 (DDE) | < mdl |
| 8 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 9 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 10 | F | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 20 | F | Y | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 21 | F | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 22 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | 0.09 (aroclor 1260) |
| 23 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 24 | M | Y | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 25 | F | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| | | | | | | | | | | |
| Detection Limits | | | <8.0 | <7.0 | <7.0 | <11 | <0.20 | <2.0 | | |

A = Adult
Y = Young
YA = Young Adult
<mdl = below method detection limit

Table 3. Chemical Residue Data of *Peromyscus leucopus* from J-Field, APG, MD.

## DEMOLITION GROUNDS

| | | | Metals (mg/kg) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| ID # | Sex | Age | As | Ba | Cd | Cr | Hg | Pb | Pesticides (mg/kg) | PCBs (mg/kg) |
| 4 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | 0.005 (DDE) | < mdl |
| 5 | F | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | 0.007 (DDE) | < mdl |
| 6 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 12 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 13 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 14 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | 0.05 (aroclor 1260) |
| 15 | F | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 16 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | 3.2801 | 0.010 (DDE) | < mdl |
| 17 | F | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 18 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 19 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| | | | | | | | | | | |
| Detection Limits | | | <8.0 | <7.0 | <7.0 | <11 | <0.20 | <2.0 | | |

A = Adult
Y = Young
YA = Young Adult
< mdl = below method detection limit

Table 4. Chemical Residue Data of *Peromyscus leucopus* from J-Field, APG, MD.

## TOXIC BURN PITS

| | | | Metals (mg/kg) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| ID # | Sex | Age | As | Ba | Cd | Cr | Hg | Pb | Pesticides (mg/kg) | PCBs (mg/kg) |
| 7 | F | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 11 | F | YA | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 26 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 27 | F | Y | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | 0.05 (aroclor 1260) |
| 28 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 29 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 30 | F | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 31 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 39 | F | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 40 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| | | | | | | | | | | |
| Detection Limits | | | <8.0 | <7.0 | <7.0 | <11 | <0.20 | <2.0 | | |

A = Adult
Y = Young
YA = Young Adult
< mdl = below method detection limit

**Table 5.** Chemical Residue Data of *Peromyscus leucopus* from J-Field, APG, MD.

## REFERENCE

| | | | Metals (mg/kg) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| ID # | Sex | Age | As | Ba | Cd | Cr | Hg | Pb | Pesticides (mg/kg) | PCBs (mg/kg) |
| 32 | F | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 33 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 34 | F | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 35 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 36 | M | A | < mdl | < mdl | < mdl | 21.9512 | < mdl | < mdl | < mdl | < mdl |
| 37 | F | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 38 | M | YA | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 41 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | 0.006 (DDE) | < mdl |
| 42 | F | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 43 | F | A | < mdl | 8.8776 | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 44 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 45 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| 46 | M | A | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl | < mdl |
| | | | | | | | | | | |
| Detection Limits | | | <8.0 | <7.0 | <7.0 | <11 | <0.20 | <2.0 | | |

A = Adult
Y = Young
YA = Young Adult
< mdl = below method detection limit

## 7. DISCUSSION.

a. Generally, levels of pesticides and PCBs did not exceed the method detection limits. Only levels of DDE in four mice and levels of Aroclor 1260 in two mice slightly exceeded the method detection limits. Because these chemicals were detected at such low frequencies and low levels, the risk to mice and their predators is probably minimal.

b. Overall, levels of metals did not exceed the method detection limits. The lead level in specimen #16 from the demolition grounds (3.280 mg/kg) slightly exceeded the method detection limits. According to the literature review by Talmage and Walton (1991), carcass concentrations of lead in white footed mice from an uncontaminated site ranged between 2.6 to 7.4 mg lead/kg dry weight. White footed mice from a contaminated site where soil lead levels ranged up to 2,700 mg lead/kg soil, had whole body lead concentrations up to17 mg/kg. These literature concentrations are significantly higher than those concentrations found at J-Field. Also, the level of barium in specimen #43 from the reference site (8.878 mg/kg) exceeded the method detection limits. However, the barium levels from J-Field mice were below the method detection limits.

c. Although the methodolgy for metals was developed for rodent tissue, the detection limits were higher than expected. The reasoning for this lies in the statistical calculations used to determine the method detection limits (MDL). Reporting values less than the MDL greatly increases the chance that a false positive is being reported.

d. Chromium in specimen #36 exceeded the method detection limit by a factor of 2 (21.951 mg/kg). However, the next highest "hit" was 5.918 mg/kg, from specimen #23, which falls below the method detection limit of 11 mg/kg. This level was not statistically significant and may be an outlier possibly related to the method of collection.

e. From the histopathology evaluation, the health of the resident white footed mouse population at J-field appeared to be normal. Abnormal findings in the liver, intestine, and skin from several mice were associated with parasite infestation, a normal consequence of field life. The reproductive organs from female mice were normal and active.

## 8. CONCLUSIONS.

a. The levels of pesticides and PCBs in mice from J-Field were minimal. Pesticide levels in three mice and PCB levels in two mice were slightly above the method detection limits. Most of the reported levels of metals in mice from J-Field were below the method detection limits. However, these method detection limits were higher than expected so that the assessment for metals is limited.

b. The health of the resident white footed mouse population at J-Field based on gross and selected histology appeared to be normal. Pathological findings in the liver, intestine, and skin from several mice were associated with parasitic infestation, a natural consequence of field life. The reproductive organs harvested from several female mice were normal and active.

9. RECOMMENDATIONS. To determine the health risk to terrestrial predators, the maximum concentrations or half of the method detection limits for non detects should be used in the terrestrial bioassessment model developed by ANL. The limitations associated with the metals analysis and the histopathology evaluation should be noted in the risk assessment.

10. ACKNOWLEDGMENTS AND APPROVAL.

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11. BIBLIOGRAPHY.

a. Amdur, M.O., J. Doull, C.D. Klaassen, 1991, *Casarett and Doull's Toxicology, the Basic Science of Poisons*, Pergamon Press, New York.

b. Nemeth, G., 1989, *RCRA Facility Assessment Report, Edgewood Area, Aberdeen Proving Ground, Maryland*, Report 39-26-0490-90, U.S. Army Environmental Hygiene Agency, Aberdeen Proving Ground, Maryland.

c. Shandu, S., et al., 1990, In Situ Evaluation of Biological Hazards of Environmental Pollutants, Volume 38, *Environmental Science and Research*, Plenum Press, New York.

d. U.S. Environmental Protection Agency, 1989, *Risk Assessment Guidance for Superfund; Environmental Evaluation Manual*, U.S. EPA Report 540/1-89-001.